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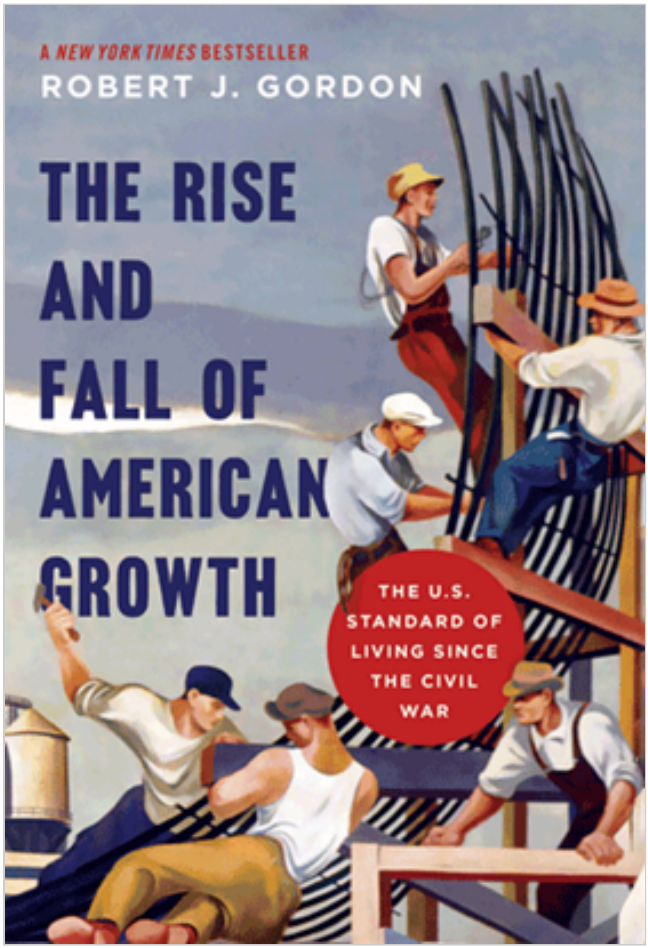
Productivity and progress

The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War. By Robert J. Gordon. Princeton, NJ: Princeton University Press, 2016, 784 pp., $39.95 hardcover.



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Is U.S. productivity growth in the middle of a long-term slowdown, or is it on the verge of a dramatic turnaround? Is the information revolution that began in the mid-1990s just a residual crumb from the banquet of innovation in computing and other technologies? Or is it a harbinger of greater revolutions to come in artificial intelligence and the digital economy? In *The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War*, Northwestern University Professor Robert J. Gordon makes the case that slow productivity growth is here to stay for at least the next quarter century.

Gordon's prediction is informed by an exploration of how the past century and a half of innovation has affected the U.S. economy and standard of living. In particular, Gordon describes how two of the greatest crises in post-Civil War history—the Great Depression and World War II—led to the most prolific period of technological and organizational innovation in the United States. Gordon looks at the responses to these historic challenges in relation to long-term productivity growth.

What does Gordon mean by "productivity," and how does it relate to economic growth? One widely used measure of productivity is labor productivity, which is defined as the ratio of real gross domestic product (GDP) to hours worked. A more detailed measure, total factor productivity (TFP), relates output to a combined index of both capital services and labor input. The labor input measure used in TFP calculations generally includes an adjustment by certain attributes of the labor force—in Gordon's case, by educational attainment. TFP can be thought of as the part of GDP that does not come from increasing inputs of capital and labor. Growth in TFP can come from improvements in technology, the organization of production, and any other indicator of how efficiently inputs are used. As such,

TFP is seen as a catch-all measurement of technological change and a key component of economic growth. As Gordon asserts in his book, current U.S. demographic and educational trends are not favorable to economic growth, so future growth must rely on increasing productivity.

One might question whether it is possible to predict how technological developments and improvements in organizational efficiency will affect productivity trends in a large economy. Gordon argues in the affirmative and devotes hundreds of pages of historical observations to make his case. His book tells the story of how a few outstanding inventions introduced in the 1870s—notably, electrification and the internal combustion engine—led to cascading surges of innovation that propelled economic growth for roughly a century. Gordon follows other economic historians in calling this post-Civil War era of abundant technological development the Second Industrial Revolution, or IR #2. (The First Industrial Revolution [IR #1] of steam engines and textile mills began in Great Britain in the late 18th century.)

IR #2 saw the United States rise to the forefront of global innovation. In addition, the effects of this revolution on productivity growth were greater and longer lasting than those of IR #1. Part I of Gordon's book studies the economic and social impacts of IR #2, which spanned the period 1870–1940. The first eight chapters detail advancements in living standards, with thematic titles such as "What they Ate and Wore and Where They Bought It" and "The American Home: From Dark and Isolated to Bright and Networked." While these chapters are immensely readable as self-contained narratives, their overarching theme is that of a 70-year burst of innovation that outlasted any similar period in history, anywhere in the world. This revolution touched every production process, every form of labor and leisure activity, every building, and every vehicle.

Central to Gordon's argument is the idea that the key inventions of IR #2 could only happen once. These inventions transformed productivity via a rapid and complete diffusion throughout society—mostly before 1940. For example, the use of motor vehicles went from nonexistent to nearly universal. Once most people gained access to this mode of transportation (either through ownership of a car or through a bus or taxi service), improvements could only be incremental. Indeed, the speed of consumer long-distance travel has not increased at all since the first modern passenger jets of the 1950s. Electrification of buildings and appliances also went from nonexistent to widespread.

Part II of the book, like Part I, is rich in both hard data and vivid historical anecdotes. In it, Gordon chronicles the shift from "revolution to evolution" since 1940. Inventions such as commercial air travel, the interstate highway system, television, mainframe computing, and antibiotics led to substantial improvements in quality of life. However, because many of these developments built directly upon the inventions of 1870–1940, they can be seen as less monumental. For example, air travel was made possible by the invention of the internal combustion engine, which was originally used for automotive travel in the late 19th century.

This era of steady progress since 1940 encompasses the long-term slowdown in productivity after 1970, as well as the temporary productivity resurgence from 1996 to 2004. Productivity growth during the resurgence period can primarily be attributed to developments in information and communications technologies (ICT)—a cluster of innovations Gordon refers to as IR #3. While he dates the beginning of this third revolution to 1960, he notes that the effects of its developments, just like those of IR #2, took several decades to show up in productivity data. However, the effects were short lived. Since 2004, TFP growth has fallen to a rate even lower than that seen during the 1970–96 slowdown.

Readers who are mainly interested in analysis and prediction may be tempted to skip ahead to Part III, in which Gordon trades his historian hat for that of an economist and a futurist. However, even in that part, the key argument of the book—that the innovations of the 1870–1970 "special century" had a deeper and more wide-ranging impact than that of any industrial revolution before or since—is strengthened by historical context. To convey the extraordinary nature of IR #2, Gordon describes the improvements in working conditions, health conditions, and consumer options for the average American between 1870 and 1970. Many of these advancements, including the great reduction in infant mortality that resulted from public health improvements such as running water and sewers, fall outside the scope of GDP measurement. Other changes, such as the replacement of oil lamps with superior incandescent light bulbs or the rise of cinema as an art form, are qualitative.

Focusing on the unmeasured aspects of quality-of-life improvement is important in light of the broad timeframe of Gordon's book. Measuring output often depends on reliable price deflators, yet new inventions and rapid qualitative changes in emerging technologies have historically been slow to transpire in official measures of price inflation. A notable example of this lag are car prices, which were not included in the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) until 1935. Gordon defends BLS improvements since 1970 in capturing quality change in the CPI, especially with respect to consumer electronic devices. However, he also notes that more gaps in older CPI data could mean that deflated value measures of GDP may in fact understate the severity of the post-1970 declines in output and productivity.

The climax of the 1870–1970 century of growth began when the Great Depression gave way to rapid industrialization at the onset of World War II. Gordon calls the 1928–50 period "the Great Leap Forward." Even as output plummeted during the 1930s, TFP growth continued to accelerate. It then peaked in the 1940s, when the innovations of the 1870s reached their full potential. In uncovering the causes of the Great Leap Forward, Gordon points to several developments that began during the Great Depression and were intensified by the war effort. New Deal legislation and wartime labor shortages caused rising wage pressures. This dynamic, along with other resource shortages, led to technological and organizational innovation born of necessity. Gordon also credits government investment in infrastructure—such as spending on bridges and dams during the Depression and factories during World War II—for increasing productivity.

But if productivity growth began to decline after 1970, why didn't GDP per capita fall between 1970 and the mid-1990s? Gordon's answer is that the entry of large numbers of women into the formal workforce led to an increase in hours worked that was large enough to offset the decline in productivity. Since around 2000, slowing productivity, without any compensatory increase in hours, has led to prolonged economic stagnation. In fact, hours worked per capita have decreased, owing to the combined effects of a decline in the working-age labor force participation rate and the retirement of baby boomers.

The demographic phenomenon of declining labor hours is one of four "headwinds" that Gordon believes will exacerbate the effect of declining productivity on living standards. The other three headwinds are stagnating educational outcomes, the persistent gap between median and mean income growth, and upcoming fiscal pressures that will limit transfer payments. Using data on labor productivity growth since 1970 as a baseline, but excluding the "productivity revival decade," Gordon predicts the negative impact of each of these headwinds on the U.S. standard of living. Overall, he forecasts a slow average annual growth rate in real median disposable income per capita:

- 1920–70: 2.25 percent
- 1970–2014: 1.46 percent
- 2015–40: 0.30 percent

Gordon offers some policy recommendations that could mitigate the slowdown in productivity. For example, noting that high school graduation rates have plateaued and that enrollment growth in colleges has begun to stall, he suggests a solution involving more investment in preschools, a reform in the property tax-based school funding system, and improvements to college affordability.

Gordon is broadly skeptical of the arguments of “techno-optimists,” who contend that current technological developments will spark increases in the rate of innovation and productivity far exceeding those of IR #3. He provides examples of how the current rate of innovation is declining, not increasing. Whereas the “special century” saw the transition from horse-drawn buggies to mass automobile ownership, the future, Gordon asserts, will see self-driving cars serving the same essential functions as conventional cars. Could 3D printing let loose a flood of untapped entrepreneurial talent? Gordon acknowledges that the technology opens new opportunities for developing prototypes and customized designs, but notes that small-scale production processes are unlikely to revolutionize the way most consumer goods are produced.

Readers should keep in mind that if Gordon’s rough forecasts prove close to the mark, growth isn’t ending, much less reversing; it’s just slowing down. Long-term improvement in living standards was almost nonexistent before the First Industrial Revolution of the late 18th century. Slow growth is still better than what most generations in history have seen.